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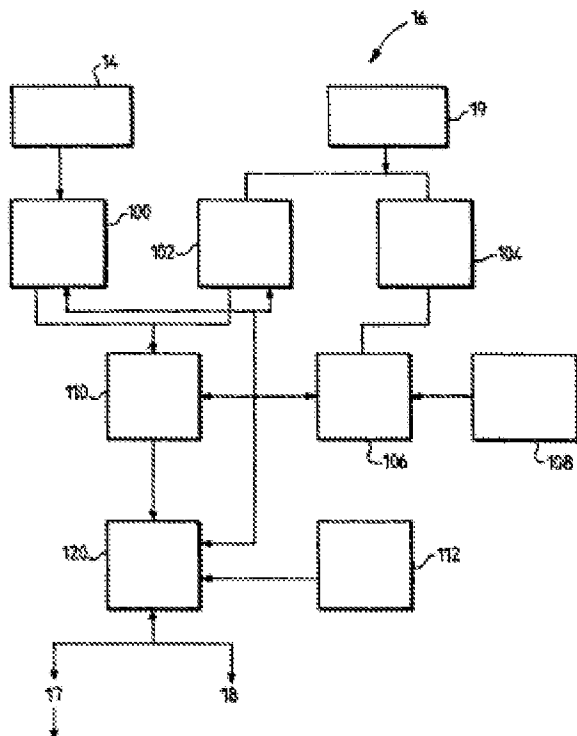
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(54) Title: DIGITAL TELEVISION RECEIVER/DECODER DEVICE WITH PLAYBACK FOR INTERACTIVE PRE-RECORDED TELEVISION PROGRAM



(57) Abstract: The invention concerns a digital television receiver/decoder comprising a module for recording and playing (40) digital sequences of digital television program (ST), and a processing module using a software application (WEA) containing initializing and marking data concerning at least the beginning and the end of the selected television program and the reception/extraction of digital sequences concerning said selected television program. The processing module receives said initializing and marking data, and compares them with the television digital data stream (FMPEG) from the demultiplexer/extraction unit. The processing module controls the recording of digital sequences concerning said selected television program (ST) and the initializing and marking data. An execution module launches, at the user's request, the playing of the digital sequences concerning said recorded television program (ST), synchronized with the execution of the software application (WEA).

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Digital Television Receiver/Decoder Device with Playback for Interactive Pre-recorded Television Program

The present invention relates to the area of digital television, and more particularly to interactivity between a pre-recorded television program and a selected software application such as an Internet or similar application.

More particularly, it applies to distance education (tele-training) in which the software application comprises a selected training course intended to be delivered remotely to a user.

In digital television, the television signals are often broadcast through a predetermined communication medium (radio relay channel, satellite, cable, etc.) to be received/decoded by an appropriate digital television receiver/decoder.

Generally such a receiver/decoder comprises:

- an input interface suitable for receiving digital television signals from a predetermined broadcast network and for delivering a stream of digital television signals;
- a demultiplexer/extractor module suitable for extracting in the digital stream of digital sequences relative to a selected television program; and
- a decoder module suitable for transforming the digital sequences thus extracted into television signals compatible with a display module.

The Applicant is presented with the problem of providing a receiver/decoder capable of recording a selected digital television program, if necessary in the absence of the user, and of playing said recorded program at the user's request in interaction and synchronized with a software application, for example an Internet or similar type of software application, for teletraining or similar purposes.

The present invention provides a solution precisely for this problem.

It concerns a digital television receiver/decoder device of the aforementioned type.

According to a general definition of the invention, the receiver/decoder device further comprises:

- a digital television program recording and playback module;
- a processing module suitable for implementing a software application that can contain initializing and marking data related at least to the start and end of a selected digital television program as well as for the reception/extraction of digital sequences related to said selected television program, said processing module being suitable for receiving said initializing and marking data from the software application, and to comparing them with the television digital data stream from the demultiplexer/extractor module, said processing module further being suitable for controlling, in response to a positive comparison, the recording of digital sequences related to said selected television program as well as the initializing and marking information, in the recording/playback module, and
- an execution module suitable for launching, at the request of a user, the playback of the digital sequences related to said television program thus recorded, synchronized with the execution of the software application by means of the initializing and marking data accompanying the television program thus recorded.

Thus, thanks to the invention, it is not only possible to record a selected digital television program, possibly in the absence of the user, but especially to play said recorded program, at the user's request, interactively with a software application of the Internet or similar type, for teletraining purposes for example.

In practice, the execution module is suitable for launching the playback of the digital sequences related to the selected television program and the execution of the software application on the same display module.

According to one aspect of the invention, the receiver/decoder device comprises man/machine interface means the actuation of which allows the user to interact simultaneously and in sync with the playback of the recorded television program and in the execution of the Internet application.

According to a preferred embodiment of the invention, the receiver/decoder device comprises a communication module capable of communicating with a remote server using a predetermined Internet type communication protocol, said communication module being of the type comprising Internet processing means suitable for cooperating with storage means capable of storing an Internet browser used for surfing the Internet and of downloading the software application into said storage means.

Preferably, the Internet processing means are suitable for cooperating with the display module and the man/machine interface means.

According to another feature of the invention, the demultiplexer/extractor module is capable of extracting the initializing and marking data from the television program and transmitting them to the Internet processing means, in order to allow, at the user's request, the execution of the Internet application locally and/or in cooperation with the remote server, synchronized with the playback of the recorded television program.

According to another feature of the invention, the Internet processing means, in cooperation with the processing means of the receiver/decoder, are suitable for driving the recording/playback module.

In practice, the Internet processing means are suitable for delivering to the recording/playback module orders such as stop, pause, pause start, start, slow, fast, backup, skip forward, skip backward, etc.

According to another aspect of the invention, the receiver/decoder device further comprises an image composition module suitable for receiving video images from the decoder module as well as the graphic images from the Internet processing means, in order to combine them in accordance with a selected image composition mode.

In practice, the image composition mode is of a type such as overprinting, multiple windowing, text, association of images. For example, the image composition module comprises:

- a first memory suitable for containing video images from the decoder module;
- a second memory suitable for containing the graphic information from the Internet processing means;
- a third memory suitable for containing an image composition program;
- image processing means suitable for extracting the selected information in the first and second memories in accordance with the composition program in order to produce the composite images;
- a module for synchronizing the display module in order to synchronize the composition of images from the two memories.

Advantageously, the receiver/decoder device comprises a serial-type interface and/or a high-speed link interface in order to connect peripheral equipment such as printer, video/camera system, audio system, video peripheral.

An object of the present invention is also a digital television processing method implemented by the receiver/decoder device according to the invention.

Other features and advantages of the invention will be seen from the following detailed description and drawings in which:

- figure 1 diagrammatically represents the different elements of the receiver/decoder according to the invention;
- figure 2 is a flowchart illustrating the recording of a selected television program as well as the simultaneous and synchronized execution of the playback of this recorded program with an Internet type software application according to the invention; and
- figure 3 illustrates the composition of images from the digital stream issuing from the recorded television program and from the digital stream issuing from the software application according to the invention.

In general, the present description has drawing elements of a specific nature. In this regard, these drawing elements can be used for a better understanding of the description of the invention, but also to contribute to the definition thereof, if necessary.

The present invention applies to any broadcast network of digital television signals. Thus, it also extends to a radio relay broadcast network as well as to satellite, cable, wired, microwave or similar.

With reference to figure 1, a digital television receiver/decoder device 1 comprises an input interface 2 connected to an antenna 4 capable of communicating with a plurality of satellites (in the case of satellite broadcast).

The input interface 2 comprises a tuner (not shown) that selects a desired channel in a selected frequency range. Said channel corresponds to a television program for which the user has access rights. The output signal from the tuner is then coherently demodulated by passing through a demodulation stage (not shown).

In practice, the stream of FMPEG digital image data from the input interface 2 is in the MPEG-2 or MPEG-4 (Motion Picture Experts Group) format, corresponding to a standard for compression of animated images. With respect to digital television, reference can be made, if needed, to the book by Hervé Benoit, “La Télévision Numérique,” Editions Dunod, Paris, 1998.

At the output of the demodulation stage, the FMPEG digital stream drives a demultiplexing block 6 allowing the selection, by means of selected filters, of elemental streams of signals in the form of packets in the MPEG-2 format, corresponding to the program selected by the user.

Because of the broadcast mode used (satellite), which is subject to errors, the multiplexing of the MPEG-2 elemental packets is preferably of the “transport” type here.

In the case of communication of pay-per-view information, the demultiplexing block 6 is further combined with a descrambler module 8 which provides for the selection and descrambling of the packets for the selected television program. The descrambling module 8 comprises an access control module that can cooperate with a memory card 10 that furnishes a descrambling key to the processor 12 of the receiver/decoder.

In practice, the processor 12 dialogs with the access control module 8 by issuing ECMs (entitlement control messages) or EMMs (entitlement management messages) and receives CW control messages.

The descrambled MPEG packets from the demultiplexing block 6 are then applied to an MPEG type decoding module 14.

The digital signals from the decoding module 14 are reconverted to analog signals by a video encoding module 16 so they can be displayed directly on a display module 18 or for video storage on an analog VCR.

The digital signals from the decoding module 14 can also be routed to a digital video processing chain via a 1394 type high speed digital link 17.

The processor 12 controls the links between modules, particularly the modules 2, 6, 8, 10, 14, 16, 17. It interprets the orders from one or more remote controls 20, 21 (remote control unit), 23 (infrared or radio frequency keyboard), 25 (infrared touch terminal). It manages the memory card reader 8 as well as the man/machine interfaces that are generally present, such as the display device 18, a USB type serial link to a computer or development station (not shown), the infrared or radio frequency data entry keyboard 23, a second interface to a second memory card reader 9 for other access rights, if needed.

The applicant considered the problem of associating new functions with such a receiver/decoder 1 that would not only record a selected digital television program, if needed in the absence of the user, but especially to interactively play back said recorded program at the user's request with a software application, for example of the Internet or similar type.

Generally, to display a digital television program broadcast by a digital television broadcast network (satellite, cable, etc), the presence of the user is required at the time of the broadcast. Otherwise, the program must be recorded on suitable equipment in order to play back the recording later.

To date, however, the recording of a digital program does not allow the use of the interactivity that can be associated with the time of the initial broadcast of the digital television program.

The result is that a previously recorded digital television program is generally passive and prevents the participation of the user for applications such as games, chat, participatory training, tele-training, distance education, etc.

The present invention remedies this disadvantage.

In particular, it makes it possible to associate a WEA software application that can be executed in sync with the playback of a previously recorded television program ST, in order to allow the active participation of the user.

Preferably, the WEA software application is transmitted by a predetermined communication network such as the Internet or similar. However, a software application available on another medium such as a CD-ROM, DVD or similar can also be used.

Access to the Internet can be accomplished by land-based methods (cable, switched telephone network, ADSL [asymmetric digital subscriber line]), or with satellite methods.

In the case of Internet access by satellite, the transmission of the WEA Internet software application from the operator/server to the user can be included advantageously in the digital television broadcast channels.

In the case of Internet access by land-based methods, the transmission of the WEA application from the operator/server to the user can also be transmitted by a communication medium separate from the broadcast of the television program, for example by means of a wired link, via a modem 30.

The method of accomplishing the synchronization of the television program ST with the WEA Internet application, which will be described in greater detail below, is similar in both types of transmission (satellite or modem) of the WEA Internet application.

Very advantageously, the WEA software application is of the tele-training type in which a cooperative effort between the student and the trainer is necessary. This cooperative effort is advantageously capable of being implemented according to the invention thanks to interactivity between a televisual sequence ST obtained in broadcast mode (lecture course), then recorded on an appropriate medium (hard disk), and personal work and training follow-up evaluation, available and implemented in a WEA software application.

Before the broadcast, the televisual sequence ST that will be recorded on a hard disk is first marked at significant subsets in the MPEG digital stream. The sequence indicators are synchronization points that specify the rank of the subsets and which will thus allow the software application to be synchronous sub-sequence by sub-sequence.

The marking of sequences which serves as reference in the interactive mode is performed directly in the transmitted MPEG digital stream.

The marking can be performed at GOPs (groups of pictures) or reference compression pictures (I Picture). This marking uses, in the transmission, coders/multiplexers adapted to include the references in the MPEG-2 streams. In playback or reception, a receiver/decoder device not equipped for interactive mode will not display the stored sequences without interference from the markers.

Advantageously, as a variation, the indicators implemented by the invention can use MPEG DTS (decoding time stamp) indicators, or PTS indicators, i.e. presentation time stamp of a sound signal or an MPEG type decoded picture.

Thanks to these indicators, it is not necessary to modify the MPEG-2 stream. Standard MPEG-2 demultiplexers are therefore able to provide standard extractions of indicators like those of the PST type.

According to the invention, therefore, provided at the output of the demultiplexing module 6 is an extraction module 50 suitable for extracting the aforementioned indicators, such as the PST type indicators.

According to the invention, an interpreter module 52 is connected to the extraction module 50 in order to interpret the indicators thus extracted, in accordance with the information system IS of the MPEG-2 digital television standard.

The triggering of the recording requires knowing the start time of the televisual sequence or television program ST.

The user can program his recording request in several ways.

In a first way, the recording request is transmitted on the Internet from a program guide. The user makes his selection and requests the recording. At the time of that request, the user's receiver/decoder communicates its identity (internal reference stored in the receiver/decoder or in a control card). The process of the recording, therefore, follows these steps:

- 1) Identification of the receiver/decoder,
- 2) Selection of the televisual sequence ST,
- 3) Storage of the choice of the sequence ST,
- 4) Issuance of a start code,
- 5) Recording on hard disk 40, and
- 6) End of recording.

The televisual sequence ST to be recorded is transmitted in the television stream according to the programming of the broadcast center. Before the transmission of the televisual sequence ST, a predetermined routine allows the recording to start in the receiver/decoder. This routine uses the

aforementioned start code and identification code. The recording is ended by a stop code associated with the identification of the receiver/decoder.

Another way, perhaps simpler at the control level, consists of receiving from the Internet network (by a wired connection and a modem), following a request similar to the one in the previous method, an identification code for the start of televisual sequence ST and end of televisual sequence ST.

The receiver/decoder waits to identify the start of the sequence ST according to the code received and records until it receives the end of sequence ST.

In practice, each televisual sequence ST is identified and transmitted without reference to the users.

Furthermore, the sequence start and end codes can be made secure by an identification code from the user (operator or identification card from the receiver/decoder).

Another embodiment consists of using the tables indicating the start of an event, tables called event information table (EIT).

These tables transmit information to the users. This information especially includes the type of the program as well as its possible broadcast, i.e. “coming in a few moments” or “in progress.”

Another solution consists of identifying the sequence ST by an external or internal means in order to pre-program this identification in the receiver/decoder device according to the invention.

Thus, for example, in a general course program, the device according to the invention waits for the identification of the unscrambled or scrambled sequence ST to perform the recording.

The launching of the playback of the television program ST, recorded according to the recording method described above, is done at the request of the user. As soon as the playback of the television program ST begins, the receiver/decoder is connected to the WEA application. The recognition of the identification of the television program ST allows the launching of the WEA application. The interactivity between the WEA application and the television program ST is accomplished by the recognition of the markers in the MPEG stream.

When the WEA software application is broadcast on the same medium as the digital television stream, the input interface and the demodulation stage can be common. The digital stream for the WEA software application is then under a coding similar to that of the FMPEG television stream and the televisual sequences ST are dissociated from the sequences related to the WEA software application, the transmission volumes for the video sequences being much longer than the interactive sequences related to the WEA software application.

As a variation, an Internet demodulator can be placed in parallel with the television demodulator, and the receiver/decoder has two channel demodulation devices and a single access to the transmitted medium. It should be noted that the Internet mode can be independent of the MPEG 2 coding. It should also be noted that this embodiment can be simplified in a case where the Internet coding is done in the same multiplex, for example IN-BAND mode.

When the television stream and the Internet stream issue from two different media (figure 1), the Internet mode can use the switched or digital telephone network (ISDN) for example. Under these conditions, the Internet system comprises its own modem 30 and a processing chain of the IP (Internet protocol) communication protocol.

In both types of connection, the transport demultiplexing chain issues information to the Internet chain to allow the execution of the Internet commands related to the different markers of the recorded sequence ST.

It should be observed that the course or WEA Internet application can be replayed easily because the interactivity is related to the recorded televisual sequence ST.

For the same broadcast of a televisual sequence ST by the TV broadcast channel, the channel can correspond to different educational actions. Thus, for the same space required of the TV channel, different levels in the training can be associated.

The correct level of training can be actuated by an Internet application adapted to the Internet network, such as the WWW protocol or the HTTP protocol.

Thus, for example it is possible to distinguish level 0 training where no training is actually offered; the TV program is received and viewed directly by viewers who are thus passive.

At an elementary level, the ST sequences can be controlled in order to verify the immediate comprehension of the user.

At an intermediate level, the content of the televisual sequences ST can be validated and activities can be proposed in the comprehension of the training, for example in the form of questions/answers.

At a higher level, the addition of exercises can be provided with references to other knowledge and an evaluation of the knowledge.

Finally, at the improvement level, the addition is provided of sequences for increasing and evaluating the level of comprehension and assimilation of the content.

At each level of training, an expert mode can be associated in which an appointment can be made with an expert intended to play a part in the progress of the educational sequence (tele-presence mode).

The expert can become involved at his own request due to the supervision of the development of the training at the program on the broadcast center or server.

On the other hand, the involvement of the expert can occur at the request of the user who wishes to have direct educational contact.

The expert mode can be of the message type, either by direct dialog with e-mail messaging, or by a video mode (video phone, video conferencing).

In expert mode, the management of the appointment must be done between the expert and the user. Establishing the appointment requires determining the time of connection on the Internet network and the execution of the training program.

The user in his training can be unaware of the hierarchical levels. He follows a training cycle that tells him the elements of the television program as well as the elements of the Internet application that will be executed.

The choice of training can be made from among several types.

When the choice is voluntary, the user can consult a catalog on the Internet or consult a training cycle to follow. If the choice is compulsory, however, the training cycle is required either on an Internet system of reference, or provided on a card like a bank card that provides the elements to the Internet processor to make the request for the recording markers.

With reference to figure 1, the receiver/decoder device according to the invention comprises for the Internet connection, Internet processing means 60 providing the link according to the Internet protocol IP and storage means 62 of software for browsing the Internet. The Internet device complies with the W3C specifications and includes a JAVA virtual machine.

The receiver/decoder device according to the invention is functionally equivalent to an Internet browser and receives Internet applications by downloading (Internet protocol stream) providing for local operation (applet/java type software module).

In operation connected to the Internet, the receiver/decoder device according to the invention is standard Internet equipment using the display module 18 and the keyboard 21 of the receiver/decoder device.

With reference to figure 2, the different functions of the receiver/decoder device according to the invention will now be described.

First, a step E1 is provided for initializing the recording of the televisual sequence ST. This initializing step consists of having information from the training program or Internet application for programming the recording function as well as the information for starting the training program directly by Internet.

The WEA Internet application provides, via the Internet (IP stream), the information for the recording.

This information comprises in particular the markers of the transport function of the basic packets in the MPEG-2 format, for the recognition of the start and end of the television program ST.

This information also includes the positioning information of the agreement function of the receiver/decoder (choice of channel, frequency, transmission parameters).

Finally, the information for adjusting the satellite dish is also indicated. This information primarily concerns the positioning of the multiplex (satellite, polarization, etc.).

Upon completion of the initializing step E1, the receiver/decoder has all the elements for starting the recording of the MPEG stream corresponding to the television sequence ST from recognition of the start marker in the MPEG transport stream.

The receiver/decoder according to the invention must be active so that the identification of the start marker can launch the storage or recording on the hard disk 40 (step E2).

The file that includes the television sequence ST can be identified by a symbolic name that will make it possible to identify the proper file at the time of execution of the Television program ST.

A naming system allows several files to be stored. The number of files stored depends on the capacity of the hard disk 40. The capacity of the disk can be several gigabytes.

To make this function effective, it is advantageous for the data to initialize the recording to contain the length of the file that will be broadcast. The length makes it possible to verify that the hard disk will allow a complete recording of the respective sequence.

The data for performing the recording are stored at the reception chain. The input circuits are positions for the receipt of the television sequence ST to be stored. These positions concern in particular the spatial positioning as well as the reception positioning.

The interpreter module 52 waits for the recognition of the identification markers of the MPEG stream related to the television sequence ST. When the markers are recognized, the recorder function of the stream ST in the hard disk 40 is carried out. This recording is performed in transport mode, that is, all of the markers of the information system IS needed for the reproduction and management of the digital television signal are stored.

The MPEG audio/video stream included in the transport mode can be recorded unscrambled after being unscrambled by the conditional access system. Under these conditions, the reproduction or

playback of the recorded file will be performed directly from the audio/video stream thus recorded after descrambling.

The recording can also be performed in scrambled mode. The recording then requires for the playback having an active descrambling system and having rights of use of the television sequence. This recording then allows the playback of the television sequence ST to be controlled.

The recording is performed in the form of a file that has as reference the name given to the television sequence ST by the WEA Internet application through the Internet at the time of the initializing.

The simultaneous and synchronized execution of the WEA application and the television sequence ST is launched at the request of the user (step E3).

In practice, the WEA Internet application is controlled by the application located on the Internet server and the respective Internet application loaded into the receiver/decoder during the aforementioned initialization phase.

At the time the WEA Internet application is launched, the user is connected to the Internet site and the television sequence ST is initialized at the sequence start, in playback mode on the hard disk.

The WEA Internet application indicates the sequence of active markers so that the reference points of the television sequence ST are transmitted via the IS MPEG interpreter to the Internet processor 60 in order to make decisions about the execution of the WEA application and the playback of the sequence ST. These decisions can be a local action of the Internet application or an action of the Internet application on the remote server.

The Internet processing module 60 can, when necessary, control the recording module 40 using basic orders that can include the following:

- stop mode: the video is stopped and the sound is or is not stopped (the recording/playback module 40 placed in standby);
- pause mode: the sequence ST is temporarily stopped, and resumes on the start order. The picture is frozen, the sound is stopped, continues or is reversed at a calculated rate;
- pause start mode: the restarting of the television sequence (audio/video) ST from the point where it was paused;
- start mode: the resumption of both audio and video from the stopping point is similar to pause-start, but follows the stop;
- slow mode: the projection of movements is slowed;
- acceleration mode: the movements of the video are accelerated;
- slow or fast rewind mode: go backward with movement only on the images;
- skip forward: the advance of the sequence ST is performed without video so that during the training cycle the sequence ST can go to a specific sub-program. This function requires the use of transport markers;
- skip backward: video sequence skips backward in order to be positioned on the image counter thanks to the marker.

It should be noted that the functions of the record/playback module 40, except for the skips, are accessible directly by the user by means of a remote control 25. The information is then

transmitted to the recording module 40 and to the WEA Internet application for the synchronization of the two streams (television sequence ST and WEA Internet application).

Execution step E3 comprises the following sub-steps:

- running (playback) of the recorded television sequence ST (step E5);
- control of the television sequence ST via the interface relative to the recording module 40;
- detection of the action markers of the WEA Internet application;
- execution of the software application (step E4) within WEA, synchronized with the record/playback module 40;
- where necessary, remote execution of the software application via the Internet module in order to synchronize the recording module 40;
- send information to the Internet processor 60 about the coexistence of the two FMPEG and FIP streams (the two streams comprising the video images issuing from the record/playback module 40, and the graphic images issuing from the Internet processor 60).

The comprehensive control information allows the images from the two sources ST and WEA to be combined. This combination mode can be of the multi-windowing type, overprinting of different photographic shots, for example printing the image related to the television sequence ST on one shot and the image related to the WE Internet on another shot.

The combination can also be performed in text mode. The pointing by one of the man/machine pointing interfaces (remote control, keyboard, touch terminal) can be performed by manipulation on the fields or zones of the screen of the display module 18.

The management of the picture and sounds is provided by a synchronization between the television sequence ST issuing from the recording/playback module 40 and the graphic representations produced by the WEA training programs.

Representations should allow a coexistence between the two sources of information managed by the Internet application and the particular actions of the man/machine interfaces (remote control, keyboard, touch terminal).

The pictures combination mode should allow the educational display of information. This display can be accomplished by windowing in which the pictures are nested picture-in-picture with one of the pictures embedded in the other, each of the pictures being able to be animated. The windowing can be done picture-to-picture, the screen associating the two pictures in two linked windows.

The combination can be accomplished by overprinting in which the different shots are overlaid. Each point of each shot is characterized and stored, as well as the overprint conditions.

Some shots can have unique comprehensive characteristics, while others can have basic definitions.

For example, shot No. 1 comprises video images issuing from the recording module 40, while shot No. 2 comprises video images with embedded text, for example the subtitle related to the television sequence ST.

Shot No. 3 can be a graphic shot issuing from the WEA Internet application. The next shot, No. 4, can be a graphic manipulation shot.

Finally, shot No. 5 can comprise a shot of fixed images pre-recorded in the recording module or in the Internet application.

The man/machine interfaces or input terminals can be mobile terminals that are used by the user during manipulation operations related to the execution of the training programs.

The remote control unit can allow the user to control the television aspect. The remote control unit has a set of functions some of which can act on the process flow of the Internet application.

The remote control unit can be equivalent to a digital television remote control.

An infrared or radio frequency type keyboard can provide an infrared link between the receiver/decoder device and the keyboard. This type of keyboard makes it possible to enter alpha-numeric codes and thus allow the composition of words. Such a keyboard is easier to manipulate than a conventional remote control unit in order to produce words.

The man/machine interface can also be a “drawing terminal” type touch terminal comprising an area for drawing by contact. This terminal is also equipped with an infrared link.

The receiver/decoder device according to the invention can include a plurality of peripheral connections, particularly connections by infrared links, digital serial links such as a USB bus, and 1394 type high speed digital links, for example for the high volume, high speed video and computer data streams.

The infrared link is advantageously used for the remote control device, for the keyboard and for the touch terminal. The terminal can be equipped with a USB serial interface for connecting peripheral equipment in order to assume additional functions such as printer, video camera system or audio playback system.

The connection of a digital camera via the USB interface can enhance the transmission to the Internet server and in particular the connection to the expert.

The connection of an audio playback system allows the reproduction of sounds to complement the audio playback system with which the equipment is equipped.

The additional USB connection makes it possible for example to work with the expert without going through the display module. The facility can be completed with mechanical robotic equipment connected by USB. These devices function by USB interface under the control of an IP type communication protocol.

It should be noted that the signals issued from the processing of the information from the digital television channel and from the Internet processing are formatted for the final display and can then be transmitted to an internal or external high speed network by means of a digital processing module connected with the type 1394 link.

Advantageously, video links can be made by the 1394 link capable of transmitting streams at fast data rates on the order of 200 to 400 Mbits/s. The video signal thus transmitted can be the television signal received and transmitted in transport mode to a digital television recorder. In this case, the receiving function is identical to that of the video recording but it can be performed on the signal pre-recorded in the storage module in order to form a subsequent copy of the television sequence ST.

The video signal can also be the combined television ST/WEA Internet signal as it is displayed on the display module. The composite image is resynchronized to be made compatible with the video recorder or an external transfer device.

The composite signal results from the association of different internal sources into a single signal that is transmitted to the display module.

This composite signal is a combination of the digital stream ST and the WEA digital stream for animated sequences as well as for the stream of pre-recorded fixed images stored in the storage means 62.

The text of the composite image can issue from the digital stream ST in MPEG format, or from the WEA Internet application in the IP format. Information from the user via the access peripherals or the man/machine interfaces can also participate in the composition of this composite signal.

Finally, information that can be calculated or processed by the WEA local program from the Internet processing can also participate in the composition of this composite signal.

The processor 12 of the receiver/decoder participates in producing the composite signal from all of the information issued from the television program ST or from the WEA Internet application.

The processor 12 formats the signals from the sources, the geographic positioning of the images to be displayed, the positioning in the space (overlaying) of the sources, as well as their possible animation.

A dimensional management of the windows or overlays thereof is also implemented.

The image composition module is an intelligent module produced from a graphic component that carries out all of the dimensioning, positioning and processing operations required to produce the final picture. The synchronization of images in the format of the display module is also carried out by the image composition module.

With reference to figure 3, the composite image composition module 16 comprises a memory 100 suitable for storing the television ST digital stream issuing from the decoding module 14, and a memory 102 suitable for storing the digital stream issuing from the Internet module 60/62.

The memory 100 is intended for reduced processing because the image is completely formatted in the decoder module 14 (MPEG format).

A memory 104 is provided for containing the program for composition of composite images.

A graphic processor 106, controlled by the composition program, processes the various data issuing from the memories 100 and 102, as well as from the local sources 108, in order to compose a native composite image 110.

A synchronization module 112 makes it possible to synchronize the exact composition of the audio/video signal 120 from the display module 18 or from the high speed video link 17.

CLAIMS

1. Digital television receiver/decoder device comprising:
 - an input interface (2) suitable for receiving digital television signals from a predetermined broadcast network and for delivering a stream of digital television signals (FMPEG);
 - a demultiplexer/extractor module (6, 50) suitable for extracting in the digital stream (FMPEG) of digital sequences relative to a selected television program (ST); and
 - a decoder module (14) suitable for transforming the digital sequences thus extracted into television signals compatible with a display module, characterized in that it further comprises:
 - a recording and playback module (40) of digital television program (ST) digital sequences;
 - a processing module suitable for implementing a software application (WEA) that can contain initializing and marking data related at least to the start and end of a selected digital television program as well as for the reception/extraction of digital sequences related to said selected television program, said processing module being suitable for receiving said initializing and marking data from the software application, and to comparing them with the television digital data stream (FMPEG) from the demultiplexer/extractor module, said processing module further being suitable for controlling, in response to a positive comparison, the recording of digital sequences related to said selected television program (ST) as well as the initializing and marking data, in the recording/playback module (40), and
 - an execution module suitable for launching, at the request of a user, the playback of the digital sequences related to said television program (ST) thus recorded, synchronized with the execution

of the software application (WEA) by means of the initializing and marking data accompanying the television program (ST) thus recorded.

2. Device as claimed in claim 1, characterized in that the execution module is suitable for launching the playback of the digital sequences related to the selected television program and the execution of the software application on the same display module (18).

3. Device as claimed in claim 1, characterized in that it further comprises man/machine interface means (20, 21, 23, 25) the actuation of which allows the user to interact simultaneously and in sync with the playback of the recorded television program (SM) and in the execution of the software application (WEA).

4. Device as claimed in claim 1, characterized in that it further comprises a communication module (30) capable of communicating with a remote server using an Internet or similar type of communication protocol, said communication module being of the type comprising Internet processing means (60) suitable for cooperating with storage means (62) capable of storing an Internet browser used for surfing the Internet and of downloading the software application (WEA) into said storage means (62).

5. Device as claimed in claim 4, characterized in that the Internet processing means (60) are suitable for cooperating with the display module (18) and the man/machine interface means of the receiver/decoder device.

6. Device as claimed in claim 5, characterized in that the demultiplexer/extractor module (6, 50, 52) is capable of extracting the initializing and marking data from the television program and transmitting them to the Internet processing means (60), in order to allow, at the user's request, the execution of the Internet application (WEA) locally and/or in cooperation with the remote server, synchronized with the playback of the recorded television program.

7. Device as claimed in claim 5, characterized in that the Internet processing means (60), in cooperation with the processing means (12) of the receiver/decoder, are suitable for driving the recording/playback module (40).
8. Device as claimed in claim 7, characterized in that the Internet processing means (60) are suitable for delivering to the recording/playback module (40) orders such as stop, pause, pause start, start, slow, fast, backup, skip forward, skip backward, etc.
9. Device as claimed in any one of the preceding claims, characterized in that it further comprises an image composition module (16) suitable for receiving video images from the decoder module (14) as well as the graphic images from the Internet processing means (60), in order to combine it [*sic*] in accordance with a selected image composition mode.
10. Device as claimed in claim 9, characterized in that the image composition mode is of a type such as overprinting, multiple windowing, text, association of images.
11. Device according to claim 9, characterized in that the image composition module (16) comprises:
- a first memory (100) suitable for containing the video images from the decoder module (14);
 - a second memory (102) suitable for containing the graphic information from the Internet processing means (60, 19);
 - a third memory (104) suitable for containing an image composition program;
 - image processing means (106) suitable for extracting the selected information in the first and second memories in accordance with the composition program in order to produce the composite images;
 - a module (112) for synchronizing the display module (18) in order to synchronize the composition of images from the two memories.

12. Device as claimed in any one of the preceding claims, characterized in that it comprises a serial-type interface and/or a high-speed link interface in order to connect peripheral equipment such as printer, video/camera system, audio system, video peripheral.

13. Method of processing digital television signals of the type comprising the following steps:

- a) receiving digital television signals from a predetermined broadcast network and delivering a stream of digital television signals (FMPEG);
 - b) extracting from the digital stream (FMPEG) digital sequences related to a selected television program (ST); and
 - c) transforming the digital sequences thus extracted into television signals compatible with a display module, characterized in that it further comprises the following steps:
 - d) implementing a software application capable of containing initializing and marking data related to at least the start and end of a selected television program as well as the reception/extraction of the digital sequences related to said selected television program;
 - e) receiving said initializing and marking data from the software application, and comparing them to the television digital stream (FMPEG) from the demultiplexer/extractor module,
 - f) controlling, in response to a positive comparison, the recording of the digital sequences related to said selected television program (ST) as well as the initializing and marking data in the record/playback module (40), and
- at the request of a user, launching the playback of the digital sequences related to said television program thus recorded (ST), synchronized with the execution of the software application (WEA) by means of initializing and marking data accompanying the television program thus recorded (ST).

[glossary of terms used in Fig. 2]

| | |
|--------------------------------------|---|
| Attente action utilisateur | Wait for action by user |
| Attente réception/décodage | Wait for receiving/decoding |
| clavier | keyboard |
| Enregistrement | Recording |
| Exécution lecture ST déroulement WEA | Execution playback ST, WEA process flow |
| FIN | END |
| FLUX | STREAM |
| Initialisation | initialization |
| télécommande | Remote control |

[please see source document for International Search Report]